

Earth science in the Antarctic Treaty System

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Summary Earth science has had a profound influence on the design, development and implementation of the Antarctic Treaty System (ATS) since the 1959 Antarctic Treaty was signed with insight that: scientific investigation in Antarctica as applied during the International Geophysical Year accords with the interests of science and the progress of all mankind. This presentation will illustrate the extensive application of Earth science concepts in policies adopted subsequently by the Antarctic Treaty Consultative Parties, who have been so designated by conducting substantial research. Digital library applications (<http://aspire.nvi.net>) will be demonstrated for Antarctic scientists to easily discover and interpret the policy relevance of their own research. Information also will be introduced about the Antarctic Treaty Summit: Science-Policy Interactions in International Governance, which is being planned to encompass the 50th anniversary of the signature day for the Antarctic Treaty on December 1, 2009.

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Introduction

The Antarctic Treaty was signed in Washington, DC on December 1, 1959 (less than one year after the International Geophysical Year) as a firm foundation for international management of nearly 10% of the Earth for peaceful purposes only. The original signatories included seven nations that claimed Antarctic territories along with five non-claimant nations, among them the United States and the Union of Soviet Socialist Republics during the heat of the cold war. Despite their differences, these twelve nations were able to agree on a firm foundation for exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering, and recommending to their Governments, measures in furtherance of the principles and objectives of the Treaty (Fig.1). It is hypothesized that science is the ‘keystone common interest’ that has enabled the Antarctic Treaty System to successfully evolve and accommodate the international community since 1959.

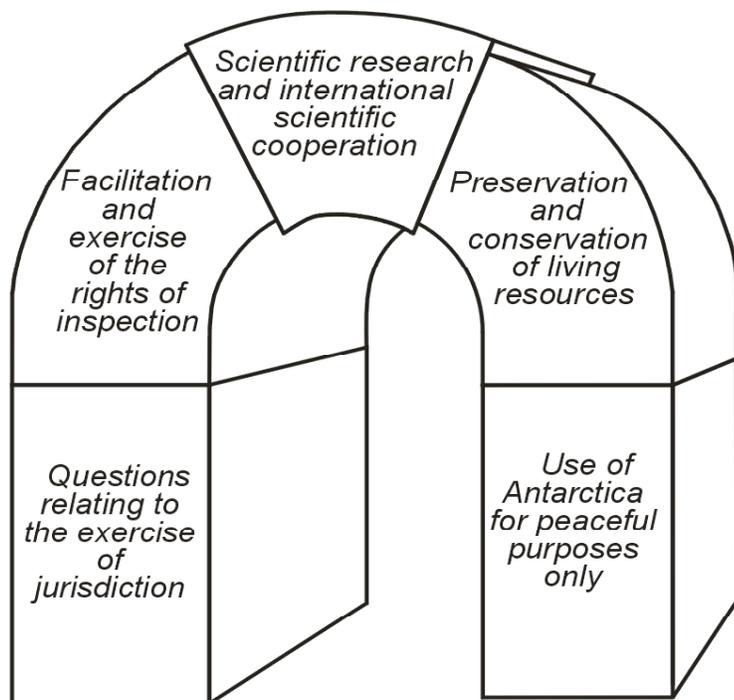


Figure 1. “Matters of common interest pertaining to Antarctica” from Article IX of the 1959 Antarctic Treaty with science as the keystone of international cooperation south of 60° South Latitude. Adapted from Berkman (2002).

Antarctic Treaty System

Science in the Antarctic Treaty is enabled by the criterion that by conducting substantial research activity in Antarctica, any nation can be entitled to participate and vote in the Antarctic Treaty Consultative Meetings (ATCM). Beyond the original signatories, sixteen new nations have achieved consultative status (<http://www.ats.aq>). In addition to these 28 Antarctic Treaty Consultative Parties, there are also 18 nations that have acceded to the Antarctic Treaty. These 46 signatories represent nearly 90% of the human population.

From the ATCM, which were convened every two years initially and now annually, the Antarctic Treaty System (ATS) has grown to include diverse regimes and associated institutions (Table 1). Notable among these institutions is the Scientific Committee on Antarctic Research (SCAR), which emerged in 1956 during preparations for the International Geophysical Year that was conducted from July 1, 1957 through December 31, 1958. This relationship between scientific or technical organizations and policy-making entities is reflected in all of the regimes that have emerged from the Antarctic Treaty.

Table 1. Antarctic Treaty System (ATS)					
Antarctic Regime	Year		Depository Government	Associated Institutions	Area of Jurisdiction
	Signed	Ratified			
Antarctic Treaty	1959	1961	United States	Specialized agencies of the United Nations and other international organizations having a scientific or technical interest in Antarctica; Antarctic Treaty Secretariat	60°S
Agreed Measures¹	1964	1964	United States	Scientific Committee on Antarctic Research (SCAR)	60°S
Seals Convention²	1972	1978	United Kingdom	SCAR	60°S + Sea Ice
Living Resources Convention³	1980	1984	Australia	CCAMLR Commission, Scientific Committee, Secretariat and Arbitral Tribunal	60°S + Antarctic Convergence
Mineral Resources Convention⁴	1988	not ratified	New Zealand	CRAMRA Commission, Advisory Committee, Regulatory Committees, Secretariat and Arbitral Tribunal	60°S
Environmental Protocol⁵	1991	1998	United States	PROTOCOL Committee on Environmental Protection (CEP) and Arbitral Tribunal along with: Annex I: Environmental Impact Assessment; Annex II: Conservation of Antarctic Fauna and Flora; Annex III: Waste Disposal and Management; Annex IV: Prevention of Marine Pollution Annex V: Area Protection and Management Annex VI: Liability	60°S

¹Agreed Measures for the Conservation of Antarctic Fauna and Flora
²Convention on the Conservation of Antarctic Seals
³Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)
⁴Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA)
⁵Protocol on Environmental Protection to the Antarctic Treaty (PROTOCOL)

Antarctic Treaty Searchable Database

The Antarctic Treaty Searchable Database (<http://aspire.nvi.net>), which is in its 8th edition, was originally developed in 1999 as a supplement for a university course on Antarctic science and policy (Berkman 2002). This digital library is now linked from diverse websites around the world (Berkman et. al., 2006), including those of:

- international government institutions (i.e., Antarctic Treaty Secretariat);
- national governmental agencies (e.g., Australian Antarctic Division, Library of Congress);
- non-governmental organizations (e.g., National Academy of Sciences, SCAR);
- academic institutions (e.g., George Washington University, Ohio State University, University of Colorado); and
- commercial organizations (e.g., International Association of Antarctic Tour Operators).

Utility of the Antarctic Treaty Searchable Database is provided by its unique functionality to comprehensively integrate the measures that have been adopted by the Antarctic Treaty Consultative Parties and to:

- dynamically generate hierarchal displays (versus lists) of ATS policies;
- reveal objective relationships among ATS policies within and between years; and
- provide a quantitative framework to interpret ATS policy relationships.

An example result from the Antarctic Treaty Searchable Database is illustrated in Table 2 for representative Earth science concepts. Not only does the ATS include concepts from diverse disciplines (such as biology, geology and glaciology), but it also contains a broad suite of technical terms (such as Cretaceous, ionosphere or isotope). It is a tribute to the International Geophysical Year and its demonstration of international cooperation that nearly half of the 869 policy measures that have been adopted by the Antarctic Treaty Consultative Parties include the term “scientific.”

Table 2. Earth Science Concepts in the Antarctic Treaty System (ATS)[§]				
Search Term		Year of Occurrence		Number of Policy Measures
Discipline	Concept	First	Recent	
	SCIENTIFIC	1959	2007	399
BIOLOGY		1975	2007	47
	adaptation	1964	2006	10
	biogeography	2000	2006	6
	evolution	1975	2007	14
	physiology	1985	2007	9
	species	1964	2007	156
CHEMISTRY		1985	2007	11
	geochemistry	2005	2007	3
	isotope	1987	2004	4
	radiocarbon	2002	2002	1
	trace elements	2006	2006	1
ECOLOGY		1966	2007	47
	conservation	1985	2007	289
	ecosystem	1966	2007	110
	food web	2002	2004	2
	habitat	1966	2007	43
	protected area	1964	2007	171
GEOLOGY		1987	2007	58
	Cretaceous	1975	2007	11
	Earth	1989	2007	33
	fossil	1975	2006	22
	geomorphology	1998	2007	25
	global	1970	2007	45
	moraine	1972	2003	33
	Quaternary	1987	2007	15
	seismic	1991	2007	8
GLACIOLOGY		1989	2007	15
	glacier	1966	2007	68
	ice core	1989	2005	3
	ice sheet	1966	2007	20
	ice stream	2005	2005	1
	ice tongue	1989	2003	5
METEOROLOGY		1961	2007	34
	atmosphere	1975	2007	12
	climate	1983	2007	48
	ozone	1989	2007	9
	wind	1972	2007	49
OCEANOGRAPHY		1989	2005	8
	convergence	1980	2003	2
	deep sea	2003	2003	2
	sea ice	1972	2007	50
	water mass	2003	2003	2
PHYSICS		1987	2007	3
	aurora	1997	2007	3
	geophysics	1987	2006	6
	ionosphere	1972	2006	4
	solar wind	2004	2004	1

[§] Derived from the Antarctic Treaty Searchable Database: 8th Edition (<http://aspire.nvi.net>), which integrates the 869 policy measures adopted by the Antarctic Treaty Consultative Parties between 1959 and the present.

Discussion

The most remote continent – alone at the bottom of the Earth, distant from all civilization – shines as a beacon of international cooperation. Antarctica represents more than a frozen ice cap surrounded by sea ice and giant icebergs with penguins and whales. Antarctica holds keys to understanding how the polar regions “respond to, amplify and drive changes elsewhere in the Earth system” (Berkman 2003). Antarctica also is a land of exploration where the world community has been developing strategies since 1959 under the Antarctic Treaty to manage nearly 10% of the Earth on the basis of freedom of scientific investigation in Antarctica as applied during the International Geophysical Year (Antarctic Treaty, Preamble).

Summary

As observed by Laurence N. Gould, former chairman of the United States National Committee on Polar Research at the National Academy of Sciences:

“The Antarctic Treaty is indispensable to the world of science which knows no national or other political boundaries, but it is much more than that... it is a document unique in history which may take its place alongside the Magna Carta and other great symbols of man's quest for enlightenment and order.”

To further assess science-policy interactions in the ATS as a model governance system for managing regions, resources and ecosystems beyond the jurisdiction of any nation – an international and interdisciplinary Antarctic Treaty Summit will be convened in Washington, DC during the week of December 1, 2009 (in the city where the Antarctic Treaty was signed on the 50th anniversary of its signature day).

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